COURSE NO: PS01CMCA35 *w.e.f. June 2020*

COMPUTER FUNDAMENTALS

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To provide basic understanding of logical organization and architecture of a computer
- To introduce fundamental concepts related to gates and logic circuits used in a digital computer
- To impart fundamental knowledge on various data structures

PREREQUISITES:

- Basic familiarity with computer systems

OUTCOMES OF THE COURSE:

- Understanding of fundamental concepts related to organization of a computer system
- Understanding of the fundamental concepts related to gates and logic circuits used in a digital computer
- Fundamental knowledge on different data structures

COURSE CONTENT

Unit No.	Course Content
1	**Introduction and Processor Organization** - Block diagram of a simple computer and its different functional units - Representation of information: integer & floating-point number representation, character codes - Error detection and correction codes - CPU organization - Instruction execution - Instruction-level parallelism: pipelining, superscalar architectures - Processor-level parallelism: array processors, multiprocessors, multicomputers - Microprocessor chips, Architecture of a typical microprocessor - RISC Vs. CISC
2	**Memory, Input/Output, Instruction Formats and Flow of Control** - Memory: main memory, secondary memory, types & organization - Input/Output: common types of I/O devices, Controllers - Design criteria for instruction formats - Addressing techniques, Instruction types - Traps & Interrupts

3 Gates and Basic Logic Circuits

- Gates, Boolean algebra, Truth tables
- Circuit equivalence, De Morgan's theorems
- Combinational circuits
- Arithmetic circuits
- Latches, Flip flops
- Introduction to Registers and Counters

4 Introduction to Data Structures

- Primitive and composite data types
- Arrays, stacks, queues, linked lists
- Binary trees, B-trees
- Hashing techniques
- Linear Search, Binary Search
- Bubble Sort

MAIN REFERENCE BOOKS:

1. Tanenbaum A. S. : Structured Computer Organization, 3rd Edition, Prentice-Hall of India Pvt. Ltd., 1993. (Tanenbaum A. S and T Austin, Structured Computer Organization, Pearson, 6th Edition, 2016).
2. Malvino A. P.: Digital Computer Electronics, 2nd Edition, 3rd Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 2017.
3. Tremblay J. & Sorenson P. G. : An Introduction to Data Structures with Applications, 2nd Edition, McGraw-Hill International Edition, 2017.

ADDITIONAL REFERENCES:

1. Hall Douglas V. : Microprocessors and Interfacing - Programming and Hardware., McGraw Hill Book Company, 3rd Edition, 2017.
2. Gothmann, William H. : Digital Electronics - An Introduction to Theory and Practice, 2nd Edition,PHI,1982.
3. Singh Bhagat & Naps Thomas : Introduction to Data Structures, Tata McGraw-Hill Publishing Co. Ltd.,1985.
4. M.M. Mano : Computer System Architecture, 3rd Edition, Pearson Education, 2000.